Low Cost SSST Alternative

Presentation to the 43rd Annual NDIA Targets, UAVs & Range Operations Symposium.

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Presented By

Commander E.G. McLean,
Directorate of Maritime Ship Systems,
National Defence Headquarters, Canada.

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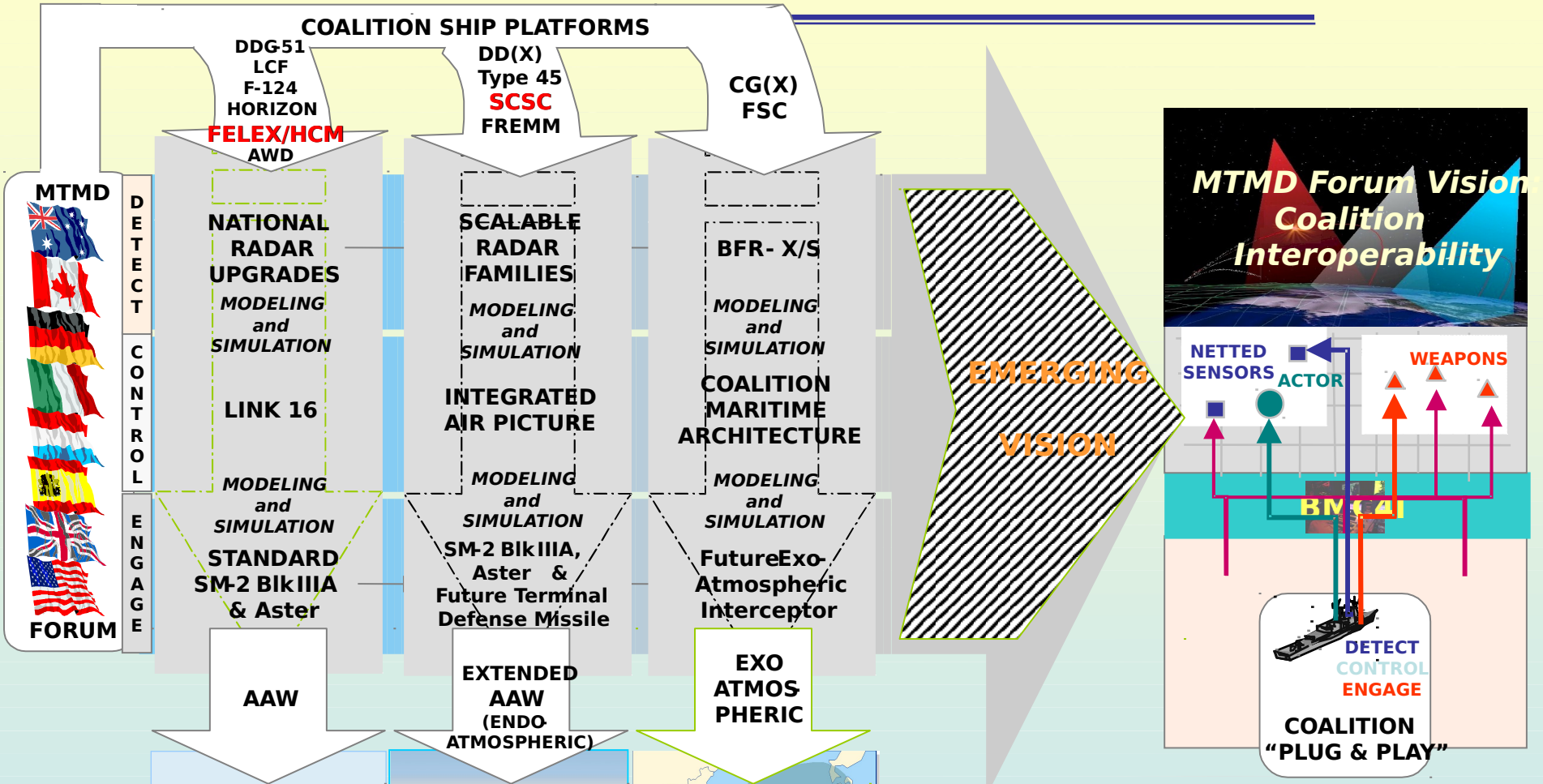
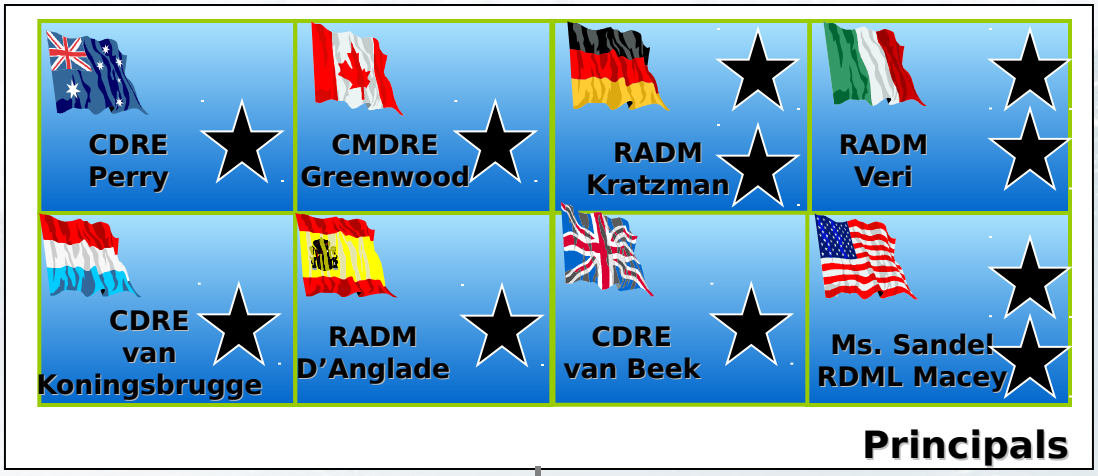
MTMD Forum Vision



"To Promote Cooperation to Achieve Interope
Among Selected Allied, Coalition Nations
in the Conduct of
Maritime Theater Missile Defense"



Working Groups

- Distributed Engineering Plant
- S-Band Radar*
- X-Band Radar*
- Open Architecture
- Modeling & Simulation
- Battle Management C4I (BMC4I)

Information Exchange Groups

- IRST
- Missile Firing Ranges
- Targets
- Weapons & Launchers
- Ship's Self Defence

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The Need

- There is a need for a Supersonic Sea Skimming Target (SSST) within a number of friendly nations.
- simdis8_Frigate_ppi_like.avi
- The existing USN solution for an SSST (“Coyote”) is too expensive for basic training purposes and in fact may not even be made available to other nations for a long time due to availability of assets and security classification. “Coyote” still needed to support future OT&E for HALIFAX Class upgrades and new Single Class Surface Combatant programs.
- ….. ….*WHAT THEN ARE THE OPTIONS OPEN TO THESE NATIONS*?

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Background

- **Based on previous programs and All-Up-Round (AUR) firings Terrier SSST is essentially a low-risk program.**

- **Surplus Terrier missiles , boosters, and Mk5 launchers could make the SSST a very cost effective target, which would deliver over 80% of the capability of Coyote at around 20% of the cost.**

- **Previous study (circa 2001) on the Mk 5 launcher has identified a refurbishment plan for re-lifeing these for new SSST service.**

- **Terrier has been validated as a Target.**

July 1998 at RIMPAC 98
Nov.98 at Autumn Events
June 1999, in Slugger

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Support from other Programs

Parts, programs and components may be adaptable for SSST (ER) from other current systems, such as;

- **LASM**
- **SM-2**
- **SM-2 Mod**
- **TBMT/SSST new**

These potential non-development "piggy-backs" can help make SSST (ER) low risk, low cost, and fast track.

Their ultimate compatibility/availability will be addressed in the SSST (ER) Project Definition stage

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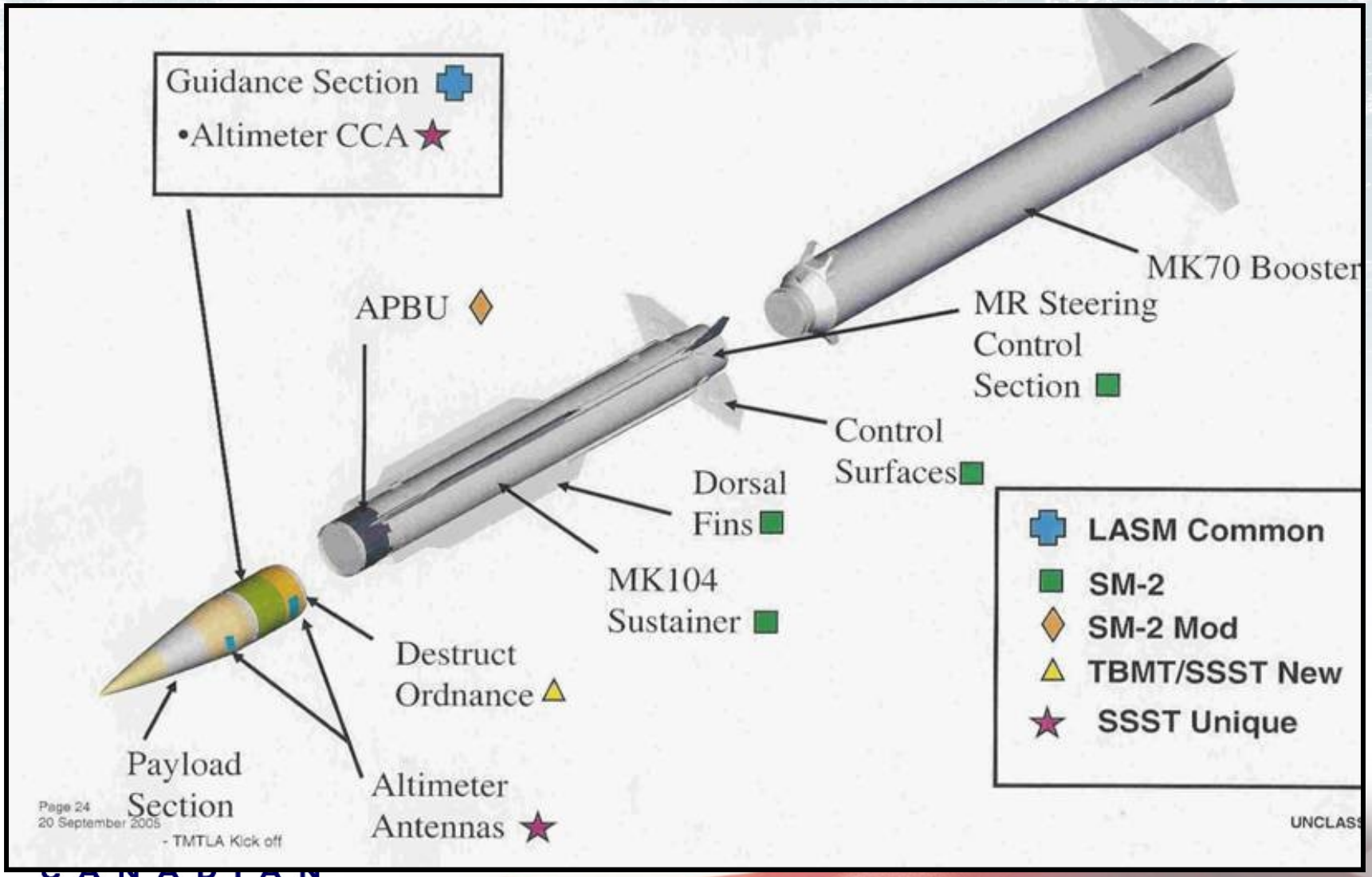
Extended Range SSST



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SSST (ER)

- **IMPROVEMENTS Over Base Terrier (Mk 30/Mk 70) Performance**
  - **Improved range (out to ~41 NM).**
  - **Improved dynamic performance**
  - **Added maneuverability**
- **MODIFICATIONS REQUIRED**
  - **Replace Mk 30 motor with re-grained Mk 104**
  - **Modify guidance system**
  - **Modify steering control unit**
- **Low Risk**
- **Low Cost, $291,525/round in production**
- **Immediate Post-Development Production (up to two rounds per month).**

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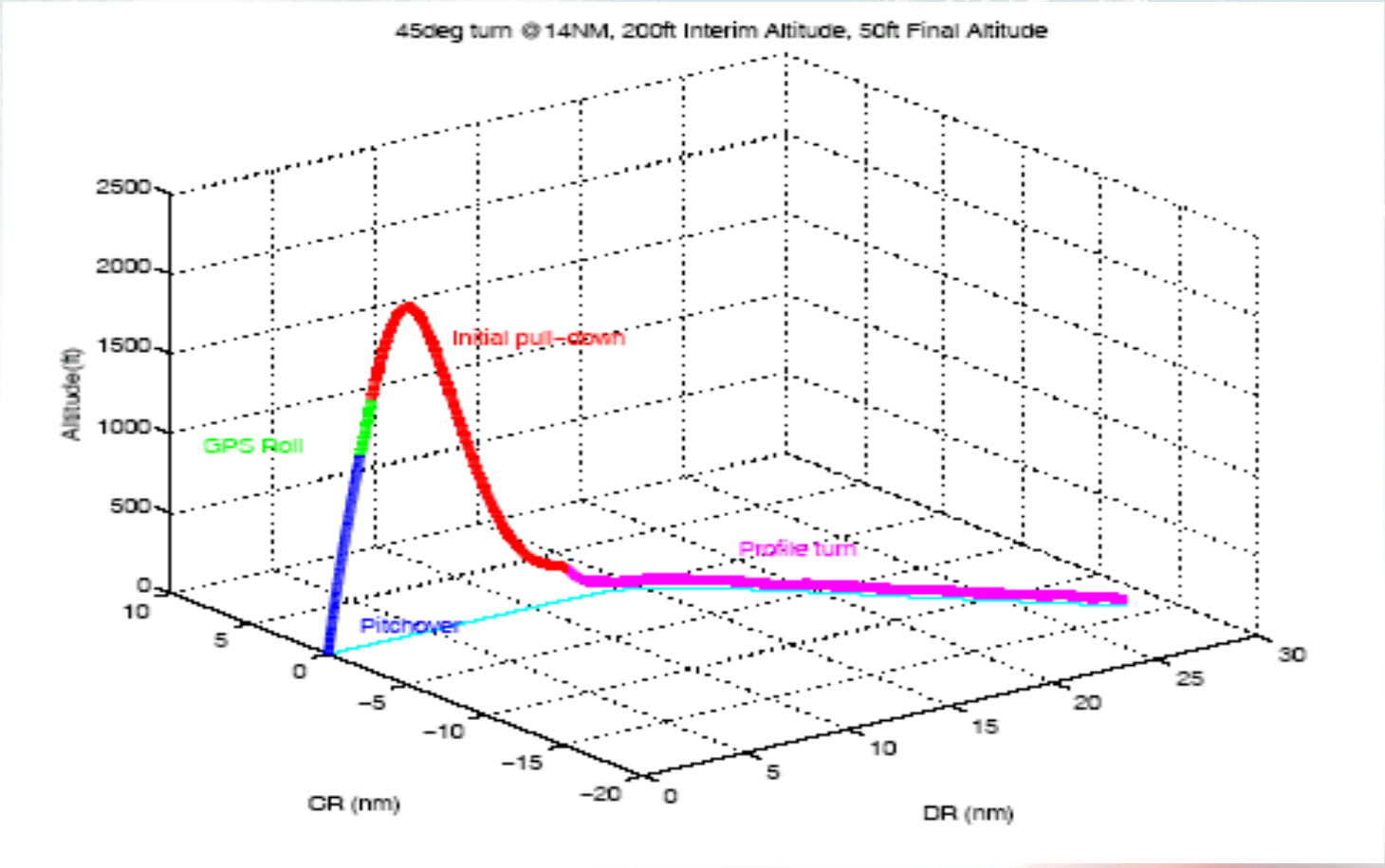
SSST (ER)



Example of Manoeuvrability; Profile turn (dog leg) is executed at 200ft,

for range safety/target engage-ability at PMFR.

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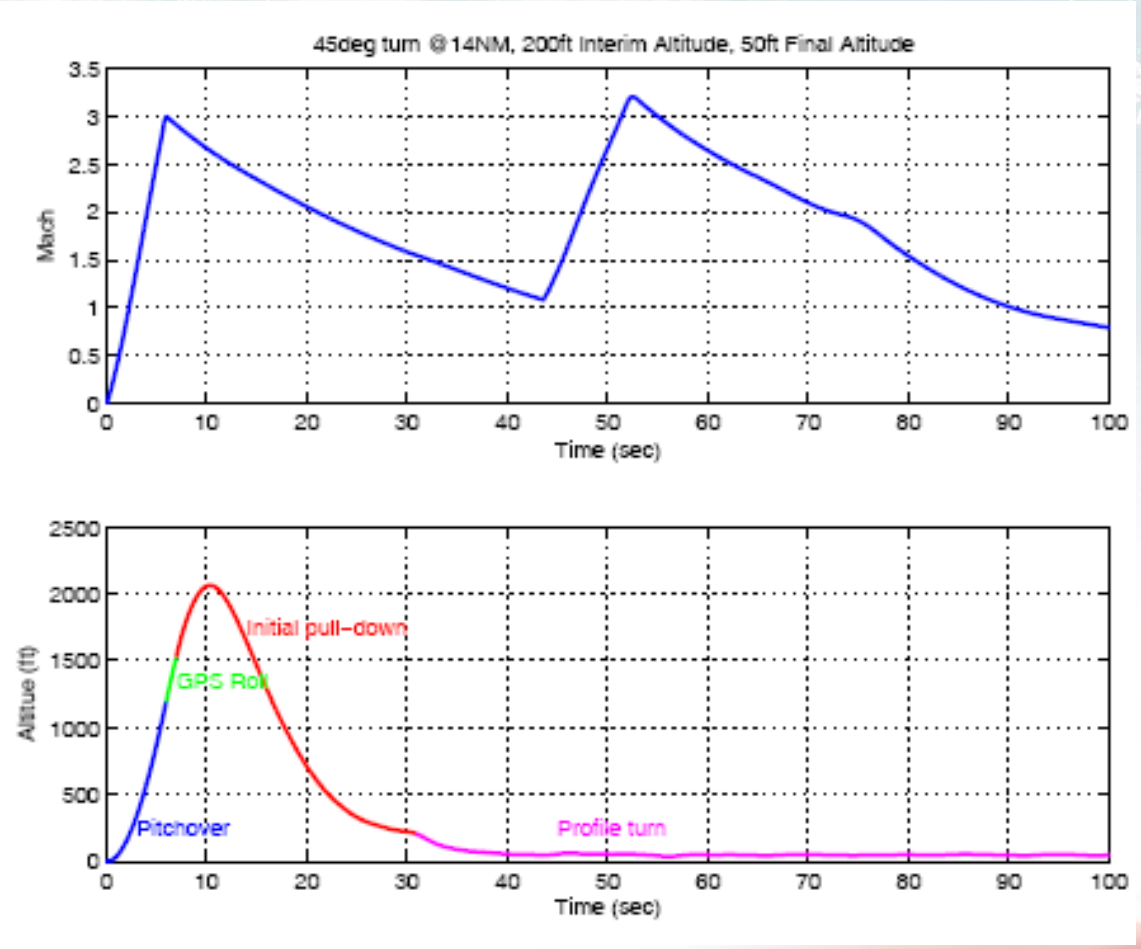
SSST (ER)



1. **Mk 70 Booster burn–out at approx. 7 sec. (Mach 3, altitude 2100ft)**
2. **Target coasts until 43 secs before igniting Mk 104 Dual thrust motor (at Mach 1.1, alt. 200ft)**
3. **Target drops to 50 ft elevation for SSS and stays supersonic until 90 secs.**
4. **Profile turn (dog leg) is executed at 200ft, for range safety/target engage-ability at**

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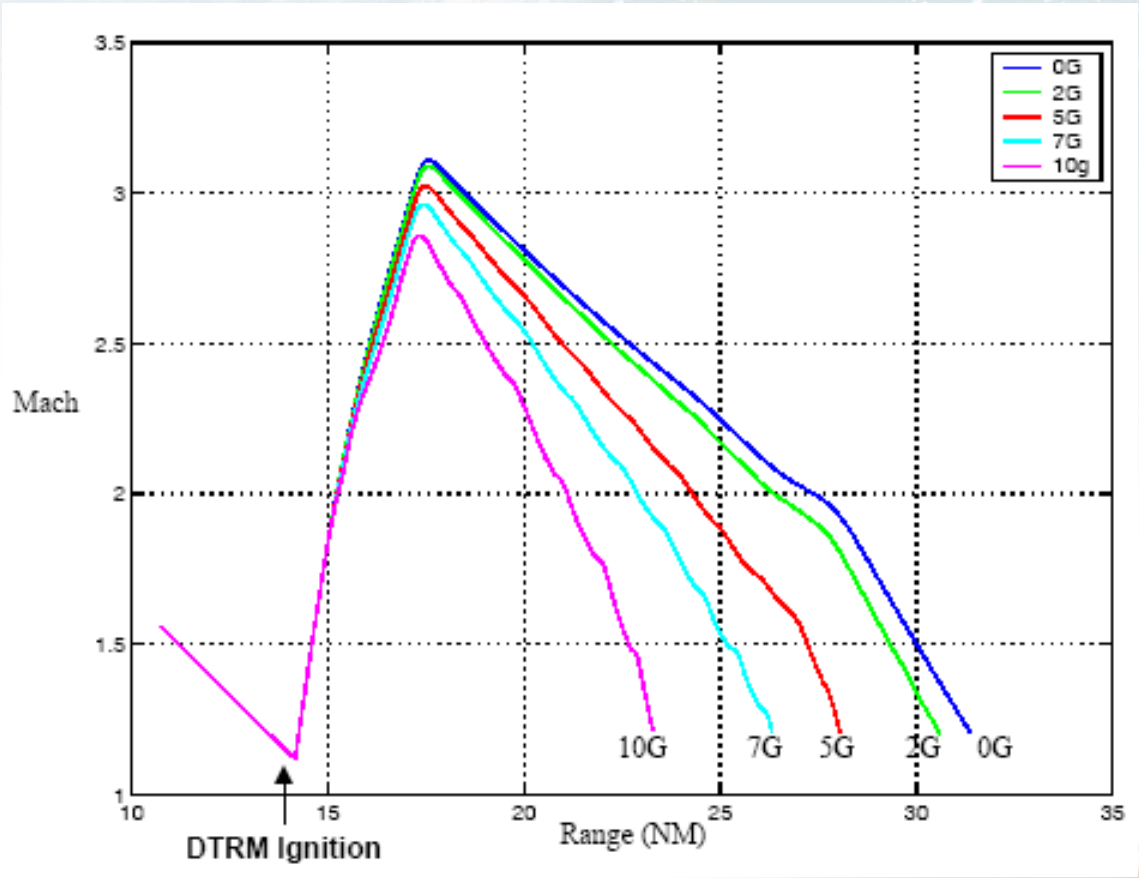
SSST (ER)



For a requirement of Alt.~50ft, Speed Mach>1.2

- **Maneuvering scrubs- off target speed.**
- **The more severe the weave the greater the reduction in effective SSS range.**

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US Launch Sites

US Launch Sites with SSST (ER) Launch Capability

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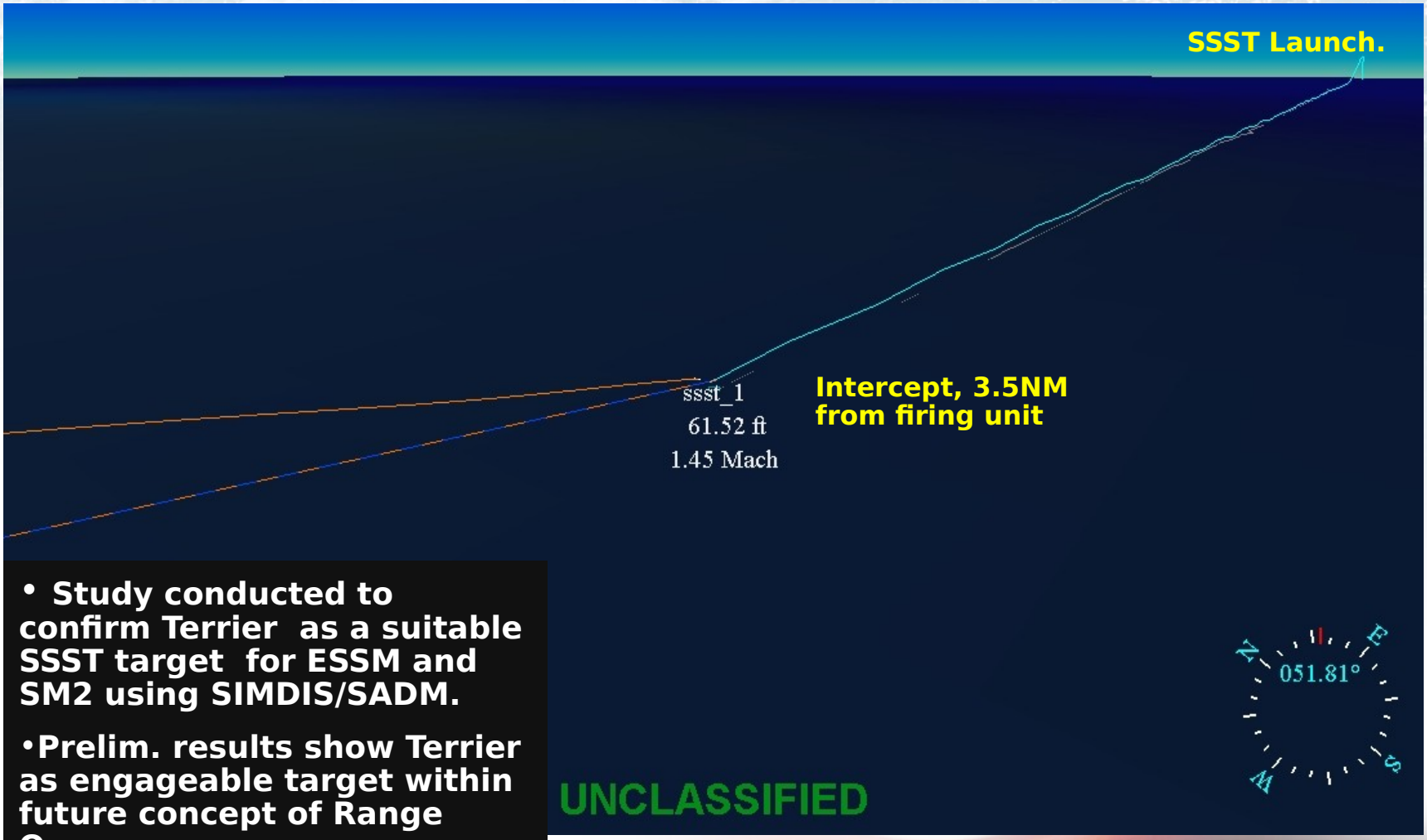
SSST (ER) Engageability



- Study conducted to confirm Terrier as a suitable SSST target for ESSM and SM2 using SIMDIS/SADM.
- Prelim. results show Terrier as engageable target within future concept of Range Ops.

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Cost Estimate-SSST (ER)

Item	Cost in US$
Project Definition (PD) substantive estimate	$1,035,000
Engineering Design. Missile NRE Launcher acquisition and refurbish Launch Control System CONOPS Training Documentation	 $2,500,000 $6,000,000 $1,000,000 $1,500,000
Prototype/Qual.Testing Prototype Rounds(5) Flight Test (less range costs)	 $1,515,295 $ 200,000
Range Infrastructure	TBD Cost will be different for individual users
TOTAL NRE	$13,750,295
Recurring Costs All Up Round (AUR)	$291,525

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SSST (ER) Program Risk

CATEGORY	RISK	AMELIORATION	ASSESSMENT
TECHNICAL			
Missile	1. Missiles may not be available 2. Propellant may be time expired/unqualified 3. Supportive docs. may be unavailable 4. Engageability may be unsuitable 5. Range Safety approval.	1. USN have confirmed availability 2. Present life + 20-years per US program(s) 3. USN stated that all supportive docs available 4. NWC simulation confirms engageability with ESSM & SM 5. FTS & SSOPs were developed and approved for development flight testing.	1. LOW RISK 2. LOW RISK 3. LOW RISK 4. LOW RISK 5. LOW RISK
Launcher	1. Launchers may not be available 2. Condition may preclude re-lifeing 3. Old design may be unsupportable 4. Sea borne launch development	1. USN have confirmed availability 2 RAN study shows refurbishment is low risk 3 RAN study shows modernization… low risk 4 Previous Canadian history of development for similar size rockets.	1. LOW RISK 2. LOW RISK 1. LOW RISK 2. LOW/MEDIUM
Launcher Control System (LCS)	1. LCS must be developed 2. LCS must be able to address the launcher & SSST with viable codes /software.	1. PMRF functionality available ▪ Compatible with COTS digitization (PC) ▪ RAN study identified Dev. as low-risk ▪ Cost estimate & timescale exists 2. USN stated that all supportive documentation would be made available with the missiles.	1. LOW~MEDIUM 2. LOW
Engageability	1. SSST may not be engageable by the SDMs of Forum member's ships	1. NWC have ran simulations against SSST and show Engageability by SM and ESSM.	1. LOW RISK
SCHEDULE	1. Bureaucratic delays (ITARS, FMS,TAAs) 2. PDA /Forum support may be late -coming	1. Navy-to-Navy transfers will minimize this effect and TAAs are in-process 2. Members will be asked to sign-up in June 2005	1. LOW RISK 2. LOW RISK
COST	1. Missile NRC and RC costs may rise. 2. Launcher NRC and RC costs may rise 3. LCS & FTS costs may rise 4. Schedule may extend to increase costs	1. Lots of previous studies /estimates done. Hardware is mature, non-developmental, and well understood. 2. RAN study, done with United Defense, is conservative and low risk 3. LCS & FTS are based on existing PMRF working models with well understood WBS and costs 4. Schedule is considered low risk with few component /segment inter-dependencies to cause cumulation.	1. LOW RISK 2. LOW RISK 3 LOW RISK 4. LOW RISK

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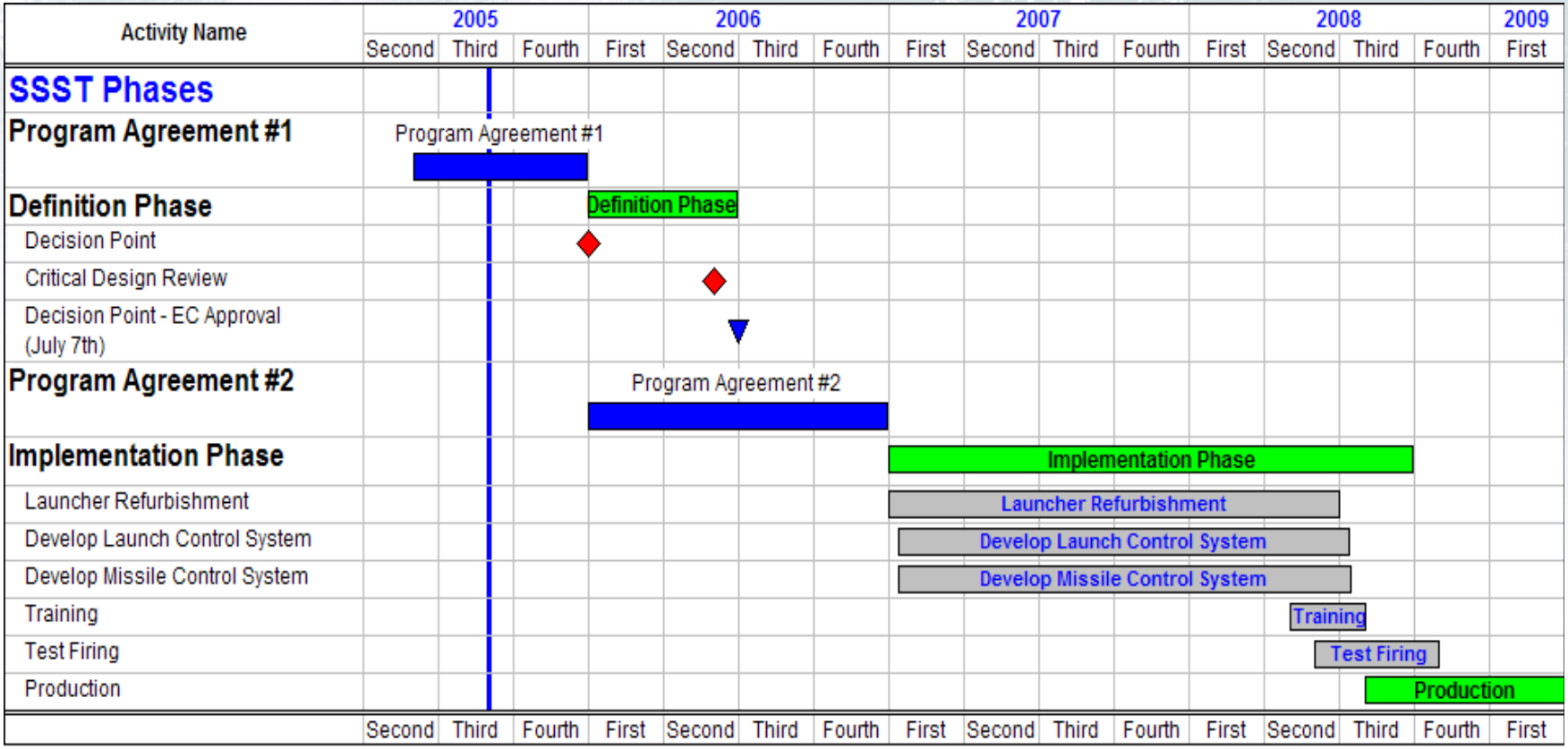
SSST (ER) Program Timelines



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Program Positives

1. **Terrier missiles have been held in surplus storage since the last of the USN LEAP ships were decommissioned in 1992~1993. There are over one thousand of these stored in bunkers in the US awaiting demilitarization.**
2. **SSST (ER) will put the USN surplus Terrier missiles to very gainful use rather than the alternative of having them undergo costly De-Militarization.**
3. **SSST (ER) will provide an affordable training target for the navies of US allies and thus increase their collective capabilities and readiness against SSSM threats. No presently available target exists for this need.**
4. **The program is practically non-developmental; assets are pre-existing or *off-the -shelf,* and a large body of knowledge and experience remains available to the program from original contractors.**

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Conclusions

1. **SSST (ER) will provide >80% of *Coyote* at <1/5th of the cost.**

2. **Terrier Missiles Block II (Mk 70/Mk30), Mk5 Launchers, and supportive documentation are currently available from USN.**

3. **SSST (ER) target could be launched right now from US ranges and in the future, from other NATO member ranges in the North Atlantic and Mediterranean.**
   - **Sites in US , compatible with SSST (ER), have been identified.**
   - **Sites in Canada and Australia, which show promise as further new launch sites, have been identified and are being studied.**
   - **Other potential sites in the North Atlantic and Mediterranean have been identified will be further considered.**

4. **The Canadian Feasibility Study has uncovered no impediment to the use of Terrier for SSST (ER), and furthermore has confirmed its economic viability.**